



# A COMPUTER SYSTEM FOR SCHEDULING FIRE USE PART II: COMPUTER TERMINAL OPERATOR'S MANUAL

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# ADP PROGRAM WRITEUP: RXWTHR

## Description

PROGRAM	CSSG*R1LIB.RXWTHR
LANGUAGE	ASCII Standard FORTRAN IV
MACHINE	FCCC UNIVAC 1100
USAGE	BATCH or DEMAND (132 characters)
PROGRAMED	Refer to: Bradshaw, Larry S., and William C. Fischer. 1981. A computer system for scheduling fire use. Part I: The system. USDA For. Serv. Gen. Tech. Rep. INT-91. Intermt. For. and Range Exp. Stn., Ogden, Utah 84401.

## Introduction

This writeup is designed to facilitate use of Program RXWTHR. Program RXWTHR is located in the USDA Forest Service Region 1 shared library of the Fort Collins Computer Center. This program was developed cooperatively by Systems for Environmental Management (SEM) and the Fire in Multiple Use Management Research, Development and Applications Program at the Northern Forest Fire Laboratory, Missoula, Mont. RXWTHR provides climatic summary, and two- and three-way co-occurrence tables from data in the National Fire Weather Data Library (NFWDL). This writeup assumes the user is familiar with data retrieval techniques from the NFWDL. Weather data is read from logical unit 15. If you are not familiar with the data library, get details from Bradshaw and Fischer (1981), or from Furman and Brink (1975). This program may be used in the batch or DEMAND mode. The writeup covers only the batch mode. To run DEMAND, create a run stream via the @DATA and @ADD commands.

## Input

User input to program RXWTHR is structured by (1) directive blocks and (2) information paragraphs. There are from one to five information paragraphs within each directive block. There is one directive block for each station to be analyzed and for each multiple analysis of a single station.

A directive block is always begun by the NUMBER OF STATIONS card and ended with the RUN control card. The NUMBER OF STATIONS card is simply the number of stations (1-99) in card columns 1 and 2. The RUN card is simply the word RUN in columns 1 to 3 on the last card of a directive block.

Information paragraphs within a directive block are set off by a control word and have from one to 15 trailing cards that provide information needed to execute the program. In RXWTHR these paragraphs are:

STATION	information (followed by three information cards)
ACTIVITY	information (followed by one information card)
SUMMARY	information (followed by one to 15 information cards)
CO-OCCUR	information (followed by one to five information cards)
DUFF	information (followed by two to five information cards)

The paragraphs may be entered in any order and are keyed by the capitalized words above beginning with column 1. Information that does not change from one directive block to the next (for multiple analyses) should not be entered in directive blocks following its original declaration.

Information to construct these directive blocks and paragraphs is taken from the User Information sheets provided by program users (exhibit 1). Card punching instructions are contained in exhibits 2, 3, 4, 5, and 6.

## Job Control Language

The following defines the job control language (JCL) needed to get weather data from the National Fire Weather Data Library and execute program RXWTHR. If you do not know the location of the data file for the station to be analyzed, execute the following control commands:

```
@ASG,A FIREDATALIB*PROGRAMS.
@XQT FIREDATALIB*PROGRAMS.LISTFILES
```

Then pick the file that contains the station to be analyzed. If more than one station is to be analyzed, pick the file containing the lowest station number. The following sequence illustrates the JCL to get data and execute RXWTHR for the examples on pages 11-15.

```
1. @RUN,PRIORITY JOBNAME,ACCOUNT,QUALIFIER,TIME,PAGES
2. @ASG,A FIREDATALIB*PROGRAMS.
3. @ASG,A FIREDATALIB*21-24.
4. @USE 2.,FIREDATALIB*21-24.
5. @ASG,UP QUALIFIER*PHILIP.
6. @USE 15.,QUALIFIER*PHILIP.
7. @XQT FIREDATALIB*PROGRAMS.GETDATA2
8. 24020755 24020777}
9. 24300260 24300277}
10. @EOF
11. @FREE 2.
12. @ASG,T 2.
13. @ASG,A CSSG*RLIB.
14. @XQT CSSG*RLIB.RXWTHR
    two directive blocks go here (see below)
15. @EOF
16. @FIN
```

Note: Actual formats are:  
SSSSSSYB SSSSSSYE

SSSSSS = 6 digit station code  
YB = Year data to begin  
YE = Year data to end

Subsequent analysis of the same station within 6 days would replace commands 2 through 11 with:

```
@ASG,A QUALIFIER*PHILIP.
@USE 15., QUALIFIER*PHILIP.
```

to obtain the same data for analysis from mass storage at FCCC.

## Example of Input Stream for Two-Station Analysis by RXWTHR

```
02 (Number of Stations)
STATION
WEST GLACIER 240207 3200 46 3
YEARS 1955 1978
DATES 0601 0915
```

first

# RXWTHR -- USER INFORMATION SHEET

Total Number Different Stations in This Run \_\_\_\_\_  
 User's Name \_\_\_\_\_, Subunit \_\_\_\_\_, Unit \_\_\_\_\_  
 Project <sup>1/</sup> \_\_\_\_\_

Fire Weather Station Information: Station name \_\_\_\_\_, No. \_\_\_\_\_  
 Elevation \_\_\_\_\_ ft., Latitude \_\_\_\_\_, Climate class <sup>2/</sup> \_\_\_\_\_, Slope class <sup>3/</sup> \_\_\_\_\_  
 Fuel model <sup>4/</sup> \_\_\_\_\_, Last frost <sup>5/</sup> \_\_\_\_\_, Grass type <sup>5/</sup>: annual \_\_\_\_\_, perennial \_\_\_\_\_  
 Year begin \_\_\_\_\_, Year end \_\_\_\_\_, Date begin \_\_\_\_\_, Date end \_\_\_\_\_

## Site Adjustment Factors (if any):

Aspect \_\_\_\_\_ ( 1=north, 2=east, 3=south, 4=west ), Site elevation \_\_\_\_\_ ft.  
 Canopy cover \_\_\_\_\_ ( 1=open, 2=closed )

## Duff/Soil Horizon Information (if Duff Moisture selected. See User's Guide, appendix D):

Layer	Duff/Soil Type	Thickness	
1	_____	_____ cm	1/ Use up to 80 characters
2	_____	_____ cm	2/ See User's Guide, appendix C
3	_____	_____ cm	3/ See User's Guide, appendix B
4	_____	_____ cm	4/ For NFDRS indices only. See User's Guide, appendix A
5	_____	_____ cm	5/ For NFDRS indices only

\*\*\*\*\*

## Summary Table(s) Requested (Select up to 15):

_____ State of the weather	_____ Min relative humidity (24 h, %)
_____ Temperature (degrees F)	_____ Precip duration (last 24 h)
_____ Relative humidity (%)	_____ Precip amount (24 h, 0.01 in)
_____ Wind direction (8 point)	_____ 1 hour fuel moisture (%)
_____ Wind speed (mi/h)	_____ 10 hour fuel moisture (%)
_____ Max temperature (24 h, deg. F)	_____ NFDRS ERC
_____ Min temperature (24 h, deg. F)	_____ NFDRS BI
_____ Max relative humidity (24 h, %)	_____ Duff Moisture (24 h average, %)

## Co-occurrence Table(s) Requested (If 2-way table desired leave last space blank. If selected, Wind Direction must always be listed first.):

1 _____ with _____	with _____
2 _____ with _____	with _____
3 _____ with _____	with _____
4 _____ with _____	with _____
5 _____ with _____	with _____

Exhibit 1.--RXWTHR User Information Sheet. Users' guide and appendixes A, B, C, and D refer to Bradshaw and Fischer (1981).

CARD PUNCHING & VERIFYING INSTRUCTIONS	Symbol		*Function		PROGRAM NAME RXWTHR	
	D P S V L		Duplicate Punch Skip Verify Left Justify		PROGRAM NUMBER	DATE
					SOURCE DOCUMENT CARD FORM USED	
					PREPARED BY LARRY BRADSHAW	PAGE <u>1</u> of <u>2</u>
CARD FIELD	COLUMNS FROM TO		NO. COLS.	FUNC. *	REMARKS	
STATION INFORMATION PARAGRAPH *****	1	7	7	P	Punch STATION -- sets up reading sequence of next three cards	
Station Name	1	16	16	P	Format 4A4, enter station name	
Station Number	17	22	6	P	Format I6, enter AFFIRMS number	
Station Elevation	24	28	5	P	Format F5.0, enter elevation (ft)	
Station Latitude	30	31	2	P	Format I2, enter latitude (degrees)	
NFDRS Fuel Model	33	33	1	P	Format A1, enter model	
NFDRS Slope Class	35	35	1	P	Format I1, enter class (1-5)	
Herbaceous Type	37	37	1	P	Format A1, enter A or P	
NFDRS Climate Class	39	39	1	P	Format I1, enter class (1-4)	
Date of Greenup *	41	44	4	P	Format I4, enter MMDD	
REPEAT **	46	46	1	P	Format L1, enter T,F or blank	
SAVE **	48	48	1	P	Format L1, enter T,F or blank	
ADJUST ***	50	50	1	P	Format L1, enter T,F or blank	
Site Aspect Code ***	52	52	1	P	Format I1, enter code (1-4)	
Site Elevation ***	54	58	5	P	Format F5.0, enter elevation	
Site Canopy Cover ***	60	60	1	P	Format I1, enter code (1-2)	
* Needed only for runs with NFDRS INDICES						
** SAVE is used to write first run computation to disk file (TAPE2), next run is then a REPEAT run and reads from TAPE2 skipping first directive block computations.						
***Needed only if site adjustments are to be made ADJUST turns the option on, the following three items specify adjustments.						

Exhibit 2.--Card punching instructions for RXWTHR Station Information paragraph.

CARD PUNCHING & VERIFYING INSTRUCTIONS	Symbol	*Function			PROGRAM NAME RXWTHR	
	D	Duplicate			PROGRAM NUMBER	DATE
	P	Punch			SOURCE DOCUMENT CARD FORM USED	
	S	Skip			PREPARED BY LARRY BRADSHAW	PAGE <u>2</u> of <u>2</u>
	V	Verify				
L	Left Justify					
CARD FIELD	COLUMNS FROM TO		NO. COLS.	FUNC. *	REMARKS	
SECOND CARD AFTER "STATION" CONTROL CARD						
Years of analysis	1	5	5	P	Punch 'YEARS'	
Beginning year	11	14	4	P	Enter 19YY	
Ending year	17	20	4	P	Enter 19YY	
THIRD CARD AFTER "STATION" CARD						
Dates	1	5	5	P	Punch 'DATES'	
Beginning date	11	14	4	P	Enter MMDD to begin	
Ending date	17	20	4	P	Enter MMDD to end	
***** *****						
<p>**** Remember that RXWTHR is limited to a 5-month analysis per execution.</p> <p>For analyses of more than 5 months, see page 10 of this report.</p>						





CARD PUNCHING & VERIFYING INSTRUCTIONS	Symbol		*Function		PROGRAM NAME RXWTHR	
	D P S V L		Duplicate Punch Skip Verify Left Justify		PROGRAM NUMBER	DATE
					SOURCE DOCUMENT CARD FORM USED	
					PREPARED BY LARRY BRADSHAW	PAGE 1 of 1
CARD FIELD	COLUMNS FROM TO		NO. COLS.	FUNC. *	REMARKS	
***** *****						
SUMMARY INFORMATION PARAGRAPH						
SUMMARY control card	1	7	7	P	Punch SUMMARY -- sets up reading	
(This is the first card					sequence.	
of the paragraph.)						
SUMMARY information	6	25	20	P/L	Punch parameter from user information	
card(s)					sheet. One card per parameter (up to	
					15 cards).	
END paragraph control	1	3	3	P	Punch END -- ends input sequence.	
card (last card of						
paragraph)						
***** *****						

Exhibit 4.--Card punching instructions for RXWTHR Summary Information paragraph.

CARD PUNCHING & VERIFYING INSTRUCTIONS	Symbol	*Function			PROGRAM NAME RXWTHR	
	D P S V L	Duplicate Punch Skip Verify Left Justify			PROGRAM NUMBER	DATE
	SOURCE DOCUMENT CARD FORM USED					
	PREPARED BY LARRY BRADSHAW				PAGE 1 of 1	
CARD FIELD	COLUMNS FROM TO		NO. COLS.	FUNC. *	REMARKS	
***** *****						
CO-OCCURRENCE INFORMATION PARAGRAPH						
CO-OCCUR CONTROL CARD (first card of paragraph)	1	8	8	P	Enter CO-OCCUR	
CO-OCCUR parameter cards (up to five)	6	25	20	L/P	Enter first parameter from information sheet.	
(Repeat for each of one to five tables.)	31	50	20	L/P	Enter second parameter from information sheet.	
	56	75	20	L/P	Enter third (if requested) parameter from information sheet, otherwise leave blank.	
End Paragraph input sequence last card of paragraph	1	3	3	P	Punch END	
***** *****						

Exhibit 5.--Card punching instructions for RXWTHR Co-occurrence Information paragraph.

CARD PUNCHING & VERIFYING INSTRUCTIONS	Symbol	*Function		PROGRAM NAME RXWTHR	
	D P S V L	Duplicate Punch Skip Verify Left Justify	PROGRAM NUMBER	DATE	
			SOURCE DOCUMENT CARD FORM USED		
			PREPARED BY LARRY BRADSHAW	PAGE <u>1</u> of <u>1</u>	
CARD FIELD	COLUMNS FROM TO		NO. COLS.	FUNC. *	REMARKS
***** *****					
DUFF INFORMATION PARAGRAPH -----					
This paragraph is only entered when the DUFF MOISTURE option is requested in					
either a SUMMARY or CO-OCCUR table information paragraph.					
The paragraph consists of a DUFF control word card that also gives the number of					
layers of duff (NLAYER) and then NLAYER information cards giving the type of duff					
(via code) and the thickness of the layer.					
Card 1. DUFF control	1	4	4	P	Punch DUFF
word and NLAYER	12	12	1	P	Enter number of layers (I1).
DUFF information cards (one for each layer, NLAYER)					
Duff type	1	5	5	P	Punch type code from user information
					sheet. Format is F5.0, decimal is
					punched.
Layer thickness	6	10	5	P	Enter thickness. Format is F5.0,
					decimal is punched, units are centi-
					meters.
***** *****					

Exhibit 6.--Card punching information for RXWTHR Duff Information paragraph.

```

directive { ACTIVITY
            BRIEF FIRE WEATHER SUMMARIES FOR WEST GLACIER HEADQUARTERS

            SUMMARY
            { TEMPERATURE
              WIND DIRECTION
            }
            END

            CO-OCCUR
            { WIND DIRECTION          WIND SPEED
              TEMPERATURE            RELATIVE HUMIDITY      WIND SPEED
            }
            END

            RUN
}

02

second { STATION
         PHILIPSBURG RS 243002  5280 46 3
        YEARS    1960 1977
directive { DATES    0501 0931
        }

        block { ACTIVITY
                  DEMONSTRATION OF RXWTHR INPUT AND OUTPUT FOR PHILIPSBURG RS
                }
        RUN
}

@EOF

@FIN

```

Exhibits 7 and 8 present user information necessary for this two-station analysis. Output from the second directive block is shown in exhibits 9, 10, 11, and 12.

## Analysis of Stations with More Than Five Months Weather Data by RXWTHR

# RXWTHR -- USER INFORMATION SHEET

Total Number Different Stations in This Run 02  
 User's Name COLONY, Subunit GLACIER NP, Unit NPS  
 Project 1/ Brief fire weather summaries for West Glacier headquarters

Fire Weather Station Information: Station name WEST GLACIER, No. 240207  
 Elevation 3200 ft., Latitude 46, Climate class 2/ 3, Slope class 3/  
 Fuel model 4/, Last frost 5/, Grass type 5/: annual \_\_\_\_\_, perennial \_\_\_\_\_  
 Year begin 1955, Year end 1978, Date begin 0601, Date end 0915

## Site Adjustment Factors (if any):

Aspect \_\_\_\_\_ ( 1=north, 2=east, 3=south, 4=west ), Site elevation \_\_\_\_\_ ft.  
 Canopy cover \_\_\_\_\_ ( 1=open, 2=closed )

## Duff/Soil Horizon Information (if Duff Moisture selected. See User's Guide, appendix D):

<u>Layer</u>	<u>Duff/Soil Type</u>	<u>Thickness</u>	
1	_____	_____ cm	***** 1/ Use up to 80 characters *****
2	_____	_____ cm	***** 2/ See User's Guide, appendix C *****
3	_____	_____ cm	***** 3/ See User's Guide, appendix B *****
4	_____	_____ cm	***** 4/ For NFDRS indices only. See User's Guide, appendix A *****
5	_____	_____ cm	***** 5/ For NFDRS indices only *****

## Summary Table(s) Requested (Select up to 15):

<input type="checkbox"/> State of the weather	<input type="checkbox"/> Min relative humidity (24 h, %)
<input checked="" type="checkbox"/> Temperature (degrees F)	<input type="checkbox"/> Precip duration (last 24 h)
<input type="checkbox"/> Relative humidity (%)	<input type="checkbox"/> Precip amount (24 h, 0.01 in)
<input checked="" type="checkbox"/> Wind direction (8 point)	<input type="checkbox"/> 1 hour fuel moisture (%)
<input type="checkbox"/> Wind speed (mi/h)	<input type="checkbox"/> 10 hour fuel moisture (%)
<input type="checkbox"/> Max temperature (24 h, deg. F)	<input type="checkbox"/> NFDRS ERC
<input type="checkbox"/> Min temperature (24 h, deg. F)	<input type="checkbox"/> NFDRS BI
<input type="checkbox"/> Max relative humidity (24 h, %)	<input type="checkbox"/> Duff Moisture (24 h average, %)

## Co-occurrence Table(s) Requested (If 2-way table desired leave last space blank. If selected, Wind Direction must always be listed first.):

1	WIND DIRECTION	with	WIND SPEED	with	
2	TEMPERATURE	with	RELATIVE HUMIDITY	with	WIND SPEED
3		with		with	
4		with		with	
5		with		with	

Exhibit 7.--User information for example of two-station analysis, first directive block.

# RXWTHR -- USER INFORMATION SHEET

Total Number Different Stations in This Run 02  
 User's Name BRADSHAW, Subunit FIRE LAB, Unit INT EXP STN  
 Project <sup>1/</sup> Demonstration of RXWTHR output for Philipsburg Ranger Station

Fire Weather Station Information: Station name PHILIPSBURG RS, No. 243002  
 Elevation 5280 ft., Latitude 46, Climate class <sup>2/</sup> 3, Slope class <sup>3/</sup>   
 Fuel model <sup>4/</sup> , Last frost <sup>5/</sup> , Grass type <sup>5/</sup> : annual , perennial   
 Year begin 1960, Year end 1977, Date begin 0501, Date end 0931

## Site Adjustment Factors (if any):

Aspect  ( 1=north, 2=east, 3=south, 4=west ), Site elevation  ft.  
 Canopy cover  ( 1=open, 2=closed )

## Duff/Soil Horizon Information (if Duff Moisture selected. See User's Guide, appendix D):

Layer	Duff/Soil Type	Thickness	
1		cm	1/ Use up to 80 characters
2		cm	2/ See User's Guide, appendix C
3		cm	3/ See User's Guide, appendix B
4		cm	4/ For NFDRS indices only. See User's Guide, appendix A
5		cm	5/ For NFDRS indices only

## Summary Table(s) Requested (Select up to 15):

<input type="checkbox"/> State of the weather	<input type="checkbox"/> Min relative humidity (24 h, %)
<input checked="" type="checkbox"/> Temperature (degrees F)	<input type="checkbox"/> Precip duration (last 24 h)
<input type="checkbox"/> Relative humidity (%)	<input type="checkbox"/> Precip amount (24 h, 0.01 in)
<input checked="" type="checkbox"/> Wind direction (8 point)	<input type="checkbox"/> 1 hour fuel moisture (%)
<input type="checkbox"/> Wind speed (mi/h)	<input type="checkbox"/> 10 hour fuel moisture (%)
<input type="checkbox"/> Max temperature (24 h, deg. F)	<input type="checkbox"/> NFDRS ERC
<input type="checkbox"/> Min temperature (24 h, deg. F)	<input type="checkbox"/> NFDRS BI
<input type="checkbox"/> Max relative humidity (24 h, %)	<input type="checkbox"/> Duff Moisture (24 h average, %)

## Co-occurrence Table(s) Requested (If 2-way table desired leave last space blank. If selected, Wind Direction must always be listed first.):

1	WIND DIRECTION	with	WIND SPEED	with	
2	TEMPERATURE	with	RELATIVE HUMIDITY	with	WIND SPEED
3		with		with	
4		with		with	
5		with		with	

Exhibit 8.--User information for example of two-station analysis, second directive block.

10 DAY AND MONTHLY SUMMARIES OF \*\*\*TEMPERATURE \*\*\*  
 RELATIVE FREQUENCY OF OCCURRENCE OF DAILY VALUES (1500 MST)  
 DEMONSTRATION OF RXWTHR OUTPUT FOR PHILLIPSBURG RANGER STATION  
 PHILLIPSBURG RS (243002) 1960-1977

PERIOD BEGINS	TEMPERATURE (F)										N. DAYS	MEAN	SD	MEDIAN	RANGE
	BELOW 55	55 TO 59	60 TO 64	65 TO 69	70 TO 74	75 TO 79	80 TO 84	85 TO 89	90 TO 94	95 AND ABOVE					
MAY 1	53.8	12.5	11.5	12.5	2.9	6.7					104	54.3	11.5	52.6	34 - 79
MAY 11	39.4	17.4	14.7	12.8	9.2	6.4					109	57.3	11.0	57.0	30 - 79
MAY 21	31.4	19.6	20.3	12.7	11.0	5.1	.8				118	59.1	10.3	59.0	33 - 84
JUN 1	21.8	14.5	13.5	21.8	15.4	9.1	2.7				110	62.8	9.8	64.0	39 - 82
JUN 11	25.7	15.5	7.3	18.3	13.8	10.1	3.7	4.6			109	63.3	11.8	64.1	34 - 88
JUN 21	13.2	12.3	9.4	15.1	19.8	13.2	12.3	4.7			105	67.7	11.6	69.0	38 - 87
JUL 1	1.4	5.8	5.8	12.3	20.3	29.0	19.6	5.1		.7	138	73.8	8.0	74.8	52 - 95
JUL 11	1.3	5.3	5.7	11.3	15.3	23.3	22.0	11.3	3.3		150	75.1	9.1	76.1	48 - 92
JUL 21	.6	1.2	4.9	8.5	10.9	23.6	29.7	19.4	1.2		165	78.0	7.5	79.1	52 - 90
AUG 1	1.9	4.4	3.9	12.6	15.4	20.1	21.4	15.1	3.8	.5	159	76.4	9.2	76.7	50 - 95
AUG 11	2.1	4.1	5.2	9.6	13.0	19.9	23.3	21.2	.7		145	76.5	9.3	77.8	45 - 91
AUG 21	11.3	8.1	8.1	11.9	13.1	22.5	15.6	6.9	1.9	.5	160	70.8	11.6	73.0	41 - 95
SEP 1	23.1	7.7		15.4	30.8		7.7	7.7	7.7		13	67.4	14.7	69.6	45 - 90
MAY	41.1	16.3	15.7	12.7	7.9	6.0	.3				331	57.0	11.1	56.7	30 - 84
JUN	20.3	14.5	10.2	18.5	15.6	10.8	6.2	3.1			325	64.6	11.3	65.4	34 - 88
JUL	1.1	4.0	5.7	10.6	15.2	25.2	24.1	12.4	1.5	.2	453	75.8	8.4	76.7	48 - 95
AUG	5.2	5.6	5.0	11.4	14.2	20.9	20.0	14.2	2.2	.4	465	74.5	10.5	75.8	41 - 95
SEP	23.1	7.7		15.4	30.8		7.7	7.7	7.7		13	67.4	14.7	69.6	45 - 90

Exhibit 9.--Program RXWTHR temperature summary output for second directive block in two-station analysis example.

10 DAY AND MONTHLY SUMMARIES OF \*\*\*WIND DIRECTION \*\*\*  
 RELATIVE FREQUENCY OF OCCURRENCE OF DAILY VALUES (1500 MST)  
 DEMONSTRATION OF RXWTHR OUTPUT FOR PHILLIPSBURG RANGER STATION  
 PHILLIPSBURG RS (243002) 1960-1977

PERIOD BEGINS	WIND DIRECTION										N. DAYS	MODE
	CALM	NE	E	SE	S	SW	W	NW	N			
MAY 1	1.9	8.7	1.9	1.9	2.9	26.9	19.2	28.8	7.7		104	NW
MAY 11	1.8	8.3	1.8	1.8	1.8	22.9	20.2	27.5	13.8		109	NW
MAY 21	.8	3.4	.8	2.5	.8	29.7	12.7	38.1	11.0		118	NW
JUN 1	5.5	5.5	3.5	4.5		18.2	14.5	39.1	9.1		110	NW
JUN 11	3.7	1.8	4.5	3.7	1.8	26.6	12.8	30.3	14.7		109	NW
JUN 21	5.7	4.7	2.8	1.9	3.8	25.5	17.9	26.4	11.3		105	NW
JUL 1	2.9	5.8	2.2	2.9	.7	25.4	15.9	29.7	14.5		138	NW
JUL 11	3.3	5.3	2.0	2.0	7.3	22.0	15.3	27.3	15.3		150	NW
JUL 21	1.2	4.8	1.2	2.4	3.0	20.6	20.0	37.6	9.1		165	NW
AUG 1	1.9	9.4	1.3	4.4	1.9	30.2	12.6	30.8	7.5		159	NW
AUG 11	2.7	1.4	1.4	1.4	1.4	28.1	17.8	19.7	6.2		145	NW
AUG 21	2.5	3.8	.6	2.5	8.8	23.1	18.8	32.5	7.5		160	NW
SEP 1					7.7	15.4	46.2	30.8			13	N
MAY	1.5	6.6	1.5	2.1	1.8	26.6	17.2	31.7	10.9		331	NW
JUN	4.9	4.0	3.7	3.4	1.8	23.4	15.1	32.0	11.7		325	NW
JUL	2.4	5.3	1.8	2.4	3.8	22.5	17.2	31.8	12.8		453	NW
AUG	2.4	4.9	1.1	2.8	4.1	27.1	16.3	34.2	7.1		465	NW
SEP					7.7	15.4	46.2	30.8			13	N

Exhibit 10.--Program RXWTHR wind direction summary output for second directive block in two-station analysis example.



WIND DIRECTION - WIND SPEED

PERCENT FREQUENCY OF CO-OCCURRENCE  
GIVEN TO TENTHS PERCENT

PHILLIPSBURG RS (243002) 1960-1977

DEMONSTRATION OF RXWTHR OUTPUT FOR PHILLIPSBURG RANGER STATION

\*\* MAY \*\*

DIR	WIND SPEED										I	TOTAL	I	
	BELOW 3	3	6	9	12	15	18	21	24	28				
		TO 5	TO 8	TO 11	TO 14	TO 17	TO 20	TO 23	TO 27	AND ABOVE				
CALM	I	1.5									I	1.5	I	
NE	I	2.7	1.8	.3	1.2		.3		.3		I	6.6	I	
E	I	.3	.6	.3		.3					I	1.5	I	
SE	I	.3	.9	.6		.3					I	2.1	I	
S	I	.3	.3	.3	.9						I	1.8	I	
SW	I	.9	9.7	5.1	4.2	3.6	2.1	.9			I	26.6	I	
W	I	1.8	1.8	6.6	2.4	3.6	.9				I	17.2	I	
NW	I	1.5	9.4	7.9	4.8	3.6	3.6	.6	.3		I	31.7	I	
N	I	.3	1.5	3.3	3.0	1.8	.6	.3			I	10.9	I	
TOTAL	I	9.7	26.0	24.5	16.6	13.3	7.5	1.8	.6	0.	I	100.0	I	
													NUMBER OF DAYS	331

NUMBER OF DAYS 331

\*\* JUN \*\*

DIR	WIND SPEED										I	TOTAL	I	
	BELOW	MPH												
		3	6	9	12	15	18	21	24	28				AND ABOVE
	3	5	8	11	14	17	20	23	27	27				
CALM	I	4.9									I	4.9	I	
NE	I	.3	1.8	.6	.9	.3					I	4.0	I	
E	I	.3	.9	1.2	.9	.3					I	3.7	I	
SE	I	.6	1.2	.6	.3		.5				I	3.4	I	
S	I		.9	.3		.6					I	1.8	I	
SW	I	4.9	6.5	3.1	4.3	1.8	1.2	1.5			I	23.4	I	
W	I	.6	4.6	2.8	3.1	3.7	.3				I	15.1	I	
NW	I	2.8	7.7	8.9	6.8	4.9	.5	.3			I	32.0	I	
N	I	.3	2.2	4.0	1.5	.9	2.5		.3		I	11.7	I	
TOTAL	I	14.8	25.8	21.5	17.8	12.6	5.2	1.8	0.	.3	I	100.0	I	
													NUMBER OF DAYS	325

NUMBER OF DAYS 325

Exhibit 11.--Program RXWTHR two-way co-occurrence output (wind direction and windspeed) for second directive block in two-station analysis example.

TEMPERATURE - RELATIVE HUMIDITY - WIND SPEED  
 PHILLIPSBURG RS (241002)  
 \*\* MAY \*\* 1960-1977  
 PERCENT FREQUENCY OF CO-OCCURRENCE, GIVEN TO TENTHS PERCENT

DEMONSTRATION OF RXWTHR OUTPUT FOR PHILLIPSBURG RANGER STATION

WIND SPEED											WIND SPEED											6 - 11 MPH										
RELATIVE HUMIDITY											RELATIVE HUMIDITY											RELATIVE HUMIDITY										
10 20 30 40 50 60 70 80 90											10 20 30 40 50 60 70 80 90											10 20 30 40 50 60 70 80 90										
10 19 29 39 49 59 69 79 89 ABOVE											10 19 29 39 49 59 69 79 89 ABOVE											10 19 29 39 49 59 69 79 89 ABOVE										
TEMP (F)	BELOW 10	10 19	20 29	30 39	40 49	50 59	60 69	70 79	80 89	90 ABOVE	BELOW 10	10 19	20 29	30 39	40 49	50 59	60 69	70 79	80 89	90 ABOVE	BELOW 10	10 19	20 29	30 39	40 49	50 59	60 69	70 79	80 89	90 ABOVE		
LT 55				.6	1.5	3.6	1.2	3.3	2.4	3.0			.3	1.2	3.3	2.4	3.6	3.0	2.1	.9			.3	1.2	3.3	2.4	3.6	3.0	2.1	.9		
55 - 59			.6	.6	2.4	1.2	.6		.3			.6	1.2	3.3	1.2	.3	.3					.6	1.2	3.3	1.2	.3	.3					
60 - 64			.6	1.8	1.8	.6	.3	.3				.3	1.5	2.7	.6	.9						.3	1.5	2.7	.6	.9						
65 - 69			1.2	2.1	.6		.3					.6	1.8	1.2	.9							.3	2.1	.9	.3							
70 - 74		.6	.9	.6			.3					.3	2.1	.9	.3							1.5	1.2	.3								
75 - 79		.3	1.2		.3																											
80 - 84		.3																														
85 - 89																																
90 - 94																																
GE 95																																
TOTAL	0.	1.2	4.5	5.7	6.6	5.7	2.4	3.6	2.7	3.0	0.	3.3	8.2	9.7	6.3	3.6	3.9	3.0	2.1	.9	0.	3.3	8.2	9.7	6.3	3.6	3.9	3.0	2.1	.9		

WIND SPEED											WIND SPEED											18 - 23 MPH										
RELATIVE HUMIDITY											RELATIVE HUMIDITY											RELATIVE HUMIDITY										
10 20 30 40 50 60 70 80 90											10 20 30 40 50 60 70 80 90											10 20 30 40 50 60 70 80 90										
10 19 29 39 49 59 69 79 89 ABOVE											10 19 29 39 49 59 69 79 89 ABOVE											10 19 29 39 49 59 69 79 89 ABOVE										
TEMP (F)	BELOW 10	10 19	20 29	30 39	40 49	50 59	60 69	70 79	80 89	90 ABOVE	BELOW 10	10 19	20 29	30 39	40 49	50 59	60 69	70 79	80 89	90 ABOVE	BELOW 10	10 19	20 29	30 39	40 49	50 59	60 69	70 79	80 89	90 ABOVE		
LT 55				.9	1.8	.9	1.5	1.2	.9				.3	.3		.3	.3						.3	.3		.3	.3					
55 - 59			.6	.9	.9	.6	.3						.3	.3		.3	.3						.3	.3		.3	.3					
60 - 64	.3		.9	1.2	.6		.3	.3					.3	.3		.3	.3						.3	.3		.3	.3					
65 - 69			.9	1.8	.3	.3		.3					.3	.3		.3	.3						.3	.3		.3	.3					
70 - 74			1.8																													
75 - 79			1.2																													
80 - 84																																
85 - 89																																
90 - 94																																
GE 95																																
TOTAL	.3	0.	5.4	4.8	3.6	1.8	2.1	1.8	.9	0.	0.	0.	0.	1.2	.3	.3	.3	.3	.3	0.	0.	0.	0.	1.2	.3	.3	.3	.3	0.	0.		

WIND SPEED											WIND SPEED											GE 24 MPH										
RELATIVE HUMIDITY											RELATIVE HUMIDITY											RELATIVE HUMIDITY										
10 20 30 40 50 60 70 80 90											10 20 30 40 50 60 70 80 90											10 20 30 40 50 60 70 80 90										
10 19 29 39 49 59 69 79 89 ABOVE											10 19 29 39 49 59 69 79 89 ABOVE											10 19 29 39 49 59 69 79 89 ABOVE										
TEMP (F)	BELOW 10	10 19	20 29	30 39	40 49	50 59	60 69	70 79	80 89	90 ABOVE	BELOW 10	10 19	20 29	30 39	40 49	50 59	60 69	70 79	80 89	90 ABOVE	BELOW 10	10 19	20 29	30 39	40 49	50 59	60 69	70 79	80 89	90 ABOVE		
LT 55																																
55 - 59																																
60 - 64																																
65 - 69																																
70 - 74																																
75 - 79																																
80 - 84																																
85 - 89																																
90 - 94																																
GE 95																																
TOTAL	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.		

WIND SPEED											WIND SPEED											GE 24 MPH										
RELATIVE HUMIDITY											RELATIVE HUMIDITY											RELATIVE HUMIDITY										
10 20 30 40 50 60 70 80 90											10 20 30 40 50 60 70 80 90											10 20 30 40 50 60 70 80 90										
10 19 29 39 49 59 69 79 89 ABOVE											10 19 29 39 49 59 69 79 89 ABOVE											10 19 29 39 49 59 69 79 89 ABOVE										
TEMP (F)	BELOW 10	10 19	20 29	30 39	40 49	50 59	60 69	70 79	80 89	90 ABOVE	BELOW 10	10 19	20 29	30 39	40 49	50 59	60 69	70 79	80 89	90 ABOVE	BELOW 10	10 19	20 29	30 39	40 49	50 59	60 69	70 79	80 89	90 ABOVE		
LT 55																																
55 - 59																																
60 - 64																																
65 - 69																																
70 - 74																																
75 - 79																																
80 - 84																																
85 - 89																																
90 - 94																																
GE 95																																
TOTAL	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.		

WIND SPEED											WIND SPEED											GE 24 MPH										
RELATIVE HUMIDITY											RELATIVE HUMIDITY											RELATIVE HUMIDITY										
10 20 30 40 50 60 70 80 90											10 20 30 40 50 60 70 80 90											10 20 30 40 50 60 70 80 90										
10 19 29 39 49 59 69 79 89 ABOVE											10 19 29 39 49 59 69 79 89 ABOVE											10 19 29 39 49 59 69 79 89 ABOVE										
TEMP (F)	BELOW 10	10 19	20 29	30 39	40 49	50 59	60 69	70 79	80 89	90 ABOVE	BELOW 10	10 19	20 29	30 39	40 49	50 59	60 69	70 79	80 89	90 ABOVE	BELOW 10	10 19	20 29	30 39	40 49	50 59	60 69	70 79	80 89	90 ABOVE		
LT 55																																
55 - 59																																
60 - 64																																
65 - 69																																
70 - 74																																
75 - 79																																
80 - 84																																
85 - 89																																
90 - 94																																
GE 95																																
TOTAL	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.		

WIND SPEED											WIND SPEED											GE 24 MPH										
RELATIVE HUMIDITY											RELATIVE HUMIDITY											RELATIVE HUMIDITY										
10 20 30 40 50 60 70 80 90											10 20 30 40 50 60 70 80 90											10 20 30 40 50 60 70 80 90										
10 19 29 39 49 59 69 79 89 ABOVE											10 19 29 39 49 59 69 79 89 ABOVE											10 19 29 39 49 59 69 79 89 ABOVE										
TEMP (F)	BELOW 10	10 19	20 29	30 39	40 49	50 59	60 69	70 79	80 89	90 ABOVE	BELOW 10	10 19	20 29	30 39	40 49	50 59	60 69	70 79	80 89	90 ABOVE	BELOW 10	10 19	20 29	30 39	40 49	50 59	60 69	70 79	80 89	90 ABOVE		
LT 55																																
55 - 59																																
60 - 64										</																						

Exhibit 12.--Program RXWTHR three-way co-occurrence output (temperature, relative humidity and windspeed) for second directive block in two-station analysis example.

## Error Messages

1. Control sequence incorrect, program aborted.

Cause: A control card was read that was uninterpretable by the program's internal dictionary. Misspelled control words or failure to start the word in column 1 of the control card are the most common causes. Can also be caused by not placing an END card at the end of an option series.

2. No summary or co-occurrence option specified, program aborted.

Cause: There is neither a SUMMARY nor a CO-OCCUR control card in the input stream.

3. Station numbers on descriptor card and data file do not match, program aborted.

Cause: Keypunch error on STATION card following STATION control card, or error in data file structure. Remember that stations must be analyzed in ascending order.

4. At least one summary option card is incorrect, program aborted.

Cause: One of the option cards trailing the SUMMARY control card is misspelled or does not begin in column 6.

5. At least one co-occurrence option card is incorrect, program aborted.

Cause: One of the option cards trailing the CO-OCCUR control card has a misspelled word, or the words do not begin in the correct columns. The correct columns are 6 and 31 for two-way tables, and 6, 31, and 56 for three-way tables.

6. Difference between site and AFFIRMS station greater than 2000 feet, no adjustments made.

Cause: When using ADJUST option, elevation differences are limited to 2000 feet. Program executes, but without any site adjustments.

7. More than 5 months weather summary requested, only first 5 months processed.

Cause: Self-explanatory -- Split data into two or three sections.

## Output Quantity

For each station, the following output is produced:

SUMMARY tables: One (1) page for each parameter requested.

CO-OCCURRENCE tables:

Two-way: One (1) page for each table per 2-month analysis (for example, a two-way table from May through August will have two pages of output)

Three-way: One (1) page for each table for each month's analysis (for example, a three-way table from May through September will produce five pages of output)

## Cost Estimates

For a typical RXWTHR run (one station, 5-month analysis, five summary tables, two to three co-occurrence tables) a user can expect costs and resource use as outlined below:

<u>Run Priority</u>	<u>Cost</u>	<u>CAU (sec)</u>	<u>Resource time (sec)</u>
DEMAND	\$6.00 - \$7.00	14 - 15	22 - 25
L	\$3.00 - \$4.00	14 - 15	22 - 25
M	\$2.00 - \$3.00	14 - 15	22 - 25
P	\$1.00 - \$2.00	14 - 15	22 - 25

## ADP PROGRAM WRITEUP: RXBURN

### Description

PROGRAM	CSSG*R1LIB.RXBURN
LANGUAGE	ASCII Standard FORTRAN IV
MACHINE	FCCC UNIVAC 1100
USAGE	BATCH or DEMAND (132 characters)
PROGRAMED	Refer to: Bradshaw, Larry S., and William C. Fischer. 1981. A computer system for scheduling fire use. Part I: the system. USDA For. Serv. Gen. Tech. Rep. INT-91. Intermt. For. and Range Exp. Stn., Ogden, Utah 84401.

### Introduction

This writeup is designed to facilitate use of program RXBURN. This program is located in the USDA Forest Service Region 1 shared library at the Fort Collins Computer Center. RXBURN summarizes occurrence frequencies of user-defined prescribed fire conditions. The program operates on data from the National Fire Weather Data Library (NFWDL). This writeup assumes the user is familiar with techniques for accessing this data. Weather data are read from logical unit 15. If you are not familiar with these procedures see Bradshaw and Fischer (1980) or Furman and Brink (1975). This program may be used in either the batch or demand mode. Batch is covered in this writeup. Demand users should create run streams via @DATA and @ADD commands and run programs the same as batch.

### Input

User input to RXBURN is structured by (1) directive blocks and (2) by information paragraphs within the directive blocks. There are from one to five information paragraphs within each directive block. Multiple-station or prescription analysis is obtained by "stacking" directive blocks.

A directive block is set off by a NUMBER OF STATIONS card and ended by a RUN card. The NUMBER OF STATIONS card is simply a card with the number of stations in columns 1 and 2. Up to 99 stations may be analyzed in a single run. The format is I2. The RUN card is simply the word RUN in columns 1 through 3 after all information has been read in the information paragraphs.

Information paragraphs within the directive blocks are set off by a control word beginning in the first column of the card and are followed by from one to 15 information cards, depending on the type of information.

Program RXBURN accepts the following words to set off information paragraphs:

STATION	information (followed by three information cards)
ACTIVITY	information (followed by one information card)
IDENTIFY	information (followed by one information card)
PRESCRIBE	information (followed by one to 15 information cards)
DUFF	information (followed by from two to five information cards)

The paragraphs may be entered in any order within a directive block, and information not changing from one directive block to the next (multiprescription or station analyses) does **not** need to be reentered in subsequent directive blocks.

Information needed to construct these directive blocks is taken from the user information sheets provided by program users (exhibit 13). Card punching instructions are contained in exhibits 14, 15, 16, 17, and 18.

## Job Control Language

The following defines the job control language (JCL) needed to get weather data from the National Fire Weather Data Library and execute program RXBURN. If you do not know the location of the data file for the station to be analyzed, execute the following control commands:

```
@ASG,A FIREDATALIB*PROGRAMS.  
@XQT FIREDATALIB*PROGRAMS.LISTFILES
```

Then pick the file that contains the station to be analyzed. If more than one station is to be analyzed, pick the file containing the lowest station number. The following sequence illustrates the JCL to get data and execute RXBURN for the examples on pages 27-30.

```
1. @RUN,PRIORITY JOBNAME,ACCOUNT,QUALIFIER,TIME,PAGES  
2. @ASG,A FIREDATALIB*PROGRAMS.  
3. @ASG,A FIREDATALIB*21-24.  
4. @USE 2.,FIREDATALIB*21-24.  
5. @ASG,UP QUALIFIER*PHILIP  
6. @USE 15.,QUALIFIER*PHILIP  
7. @XQT FIREDATALIB*PROGRAMS.GETDATA2  
8. 24300260 24300277  
9. @EOF  
10. @FREE 2.  
11. @ASG,T 2.  
12. @ASG,A CSSG*R1LIB.  
13. @XQT CSSG*R1LIB.RXBURN  
14. @EOF  
15. @FIN
```

Note: Actual formats are:  
SSSSSSYB SSSSSSYE

SSSSSS = 6 digit station code  
YB = Year data to begin  
YE = Year data to end

Subsequent analysis of the same station within six days would replace commands 2 through 11 with:

```
@ASG,A QUALIFIER*PHILIP.  
@USE 15., QUALIFIER*PHILIP,
```

to obtain the same data for analysis from mass storage at FCCC.

# RXBURN -- USER INFORMATION SHEET

Total Number Different Stations in This Run \_\_\_\_\_

User's Name \_\_\_\_\_, Subunit \_\_\_\_\_, Unit \_\_\_\_\_

Project <sup>1/</sup> \_\_\_\_\_

Fire Weather Station Information: Station name \_\_\_\_\_, No. \_\_\_\_\_

Elevation \_\_\_\_\_ ft., Latitude \_\_\_\_\_, Climate class <sup>2/</sup> \_\_\_\_\_, Slope class <sup>3/</sup> \_\_\_\_\_

Fuel model <sup>4/</sup> \_\_\_\_\_, Last frost <sup>5/</sup> \_\_\_\_\_, Grass type <sup>5/</sup> \_\_\_\_\_; annual \_\_\_\_\_, perennial \_\_\_\_\_

Year begin \_\_\_\_\_, Year end \_\_\_\_\_, Date begin \_\_\_\_\_, Date end \_\_\_\_\_

Site Adjustment Factors (if any):

Aspect \_\_\_\_\_ ( 1=north, 2=east, 3=south, 4=west ), Site elevation \_\_\_\_\_ ft.

Canopy cover \_\_\_\_\_ ( 1=open, 2=closed )

Duff/Soil Horizon Information (if Duff Moisture selected. See User's Guide, Appendix D):

Layer	Duff/Soil Type	Thickness	
1	_____	_____ cm	1/ Use up to 80 characters
2	_____	_____ cm	2/ See User's Guide, appendix C
3	_____	_____ cm	3/ See User's Guide, appendix B
4	_____	_____ cm	4/ For NFDRS indicies only. See User's Guide, appendix A
5	_____	_____ cm	5/ For NFDRS indicies only

Prescription Factor Selections (Check and set limits for up to 15 factors.):

Factor	Preferable Rx		Acceptable Rx	
	Minimum	Maximum	Minimum	Maximum
State of the weather.....	_____	_____	_____	_____
Temperature (deg. F).....	_____	_____	_____	_____
Relative humidity (%).....	_____	_____	_____	_____
Wind direction (8 point).....	_____	_____	_____	_____
Wind speed (mi/h).....	_____	_____	_____	_____
Max temperature (24 h, deg. F).....	_____	_____	_____	_____
Min temperature (24 h, deg. F).....	_____	_____	_____	_____
Max relative humidity (24 h, %).....	_____	_____	_____	_____
Min relative humidity (24 h, %).....	_____	_____	_____	_____
Days since last precipitation.....	_____	_____	_____	_____
Precip amount (24 h, 0.01 in).....	_____	_____	_____	_____
1 hour fuel moisture (%).....	_____	_____	_____	_____
10 hour fuel moisture (%).....	_____	_____	_____	_____
NFDRS ERC.....	_____	_____	_____	_____
NFDRS BI.....	_____	_____	_____	_____
Duff moisture (24 h average, %).....	_____	_____	_____	_____

Exhibit 13.--RXBURN User Information Sheet. User's guide and appendixes A, B, C, and D refer to Bradshaw and Fischer (1981).

CARD PUNCHING & VERIFYING INSTRUCTIONS	Symbol	*Function			PROGRAM NAME RXBURN		
	D P S V L	Duplicate Punch Skip Verify Left Justify			PROGRAM NUMBER		DATE
					SOURCE DOCUMENT CARD FORM USED		
					PREPARED BY LARRY BRADSHAW		PAGE 1 of 2
CARD FIELD	COLUMNS FROM TO		NO. COLS.	FUNC. *	REMARKS		
STATION INFORMATION PARAGRAPH*****	1	7	7	P	Punch STATION -- sets up reading . sequence of next three cards		
Station Name	1	16	16	P	Format 4A4, enter station name		
Station Number	17	22	6	P	Format I6, enter AFFIRMS number		
Station Elevation	24	28	5	P	Format F5.0, enter elevation (ft)		
Station Latitude	30	31	2	P	Format I2, enter latitude (degrees)		
NFDRS Fuel Model	33	33	1	P	Format A1, enter model		
NFDRS Slope Class	35	35	1	P	Format I1, enter class (1-5)		
Herbaceous Type	37	37	1	P	Format A1, enter A or P		
NFDRS Climate Class	39	39	1	P	Format I1, enter class (1-4)		
Date of Greenup *	41	44	4	P	Format I4, enter MMDD		
REPEAT **	46	46	1	P	Format L1, enter T,F or blank		
SAVE **	48	48	1	P	Format L1, enter T,F or blank		
ADJUST ***	50	50	1	P	Format L1, enter T,F or blank		
Site Aspect Code ***	52	52	1	P	Format I1, enter code (1-4)		
Site Elevation ***	54	58	5	P	Format F5.0, enter elevation		
Site Canopy Cover ***	60	60	1	P	Format I1, enter code (1-2)		
* Needed only for runs with NFDRS INDICES							
** SAVE is used to write first run computation to disk file (TAPE2), next run is then a REPEAT run and reads from TAPE2 skipping first directive block computations.							
*** Needed only if site adjustments are to be made. ADJUST turns the option on, the following three items specify adjustments.							

Exhibit 14.--Card punching instructions for RXBURN Station Information paragraph.

CARD PUNCHING & VERIFYING INSTRUCTIONS	Symbol	*Function		PROGRAM NAME RXBURN	
	D	Duplicate		PROGRAM NUMBER	DATE
	P	Punch		SOURCE DOCUMENT CARD FORM USED	
	S	Skip		PREPARED BY LARRY BRADSHAW	
	V	Verify		PAGE 2 of 2	
L	Left Justify				
CARD FIELD	COLUMNS FROM TO		NO. COLS.	FUNC. *	REMARKS
SECOND CARD AFTER "STATION" CONTROL CARD					
Years of analysis	1	5	5	P	Punch 'YEARS'
Beginning year	11	14	4	P	Enter 19YY
Ending year	17	20	4	P	Enter 19YY
THIRD CARD AFTER "STATION" CARD					
Dates	1	5	5	P	Punch 'DATES'
Beginning date	11	14	4	P	Enter MMDD to begin
Ending date	17	20	4	P	Enter MMDD to end
***** *****					







CARD PUNCHING & VERIFYING INSTRUCTIONS	Symbol	*Function		PROGRAM NAME RXBURN	
	D P S V L	Duplicate Punch Skip Verify Left Justify	PROGRAM NUMBER		DATE
			SOURCE DOCUMENT CARD FORM USED		
			PREPARED BY LARRY BRADSHAW		PAGE __ of __
CARD FIELD	COLUMNS FROM TO		NO. COLS.	FUNC. *	REMARKS
***** *****					
PRESCRIPTION INFORMATION	PARAGRAPH -- defines prescriptions for program analysis.				
The first card sets up a reading sequence of NPARM trailing cards. NPARM has a value from 1 to 15.					
Card 1. PRESCRIBE -- NPARM 1	9	9	P	Punch PRESCRIBE	
enter NPARM	11	12	2	P	Enter total number of parameters in the
					prescription. Format I2, right
					justified.
Information card(s) -- one for each prescription parameter.					
Parameter	6	30	25	P/L	Enter factor from information sheet.
Preferred Minimum Value	33	35	3	P	Enter value (right justified)
Preferred Maximum Value	38	40	3	P	Enter value (right justified)
Acceptable Minimum Value	43	45	3	P	Enter value (right justified)
imum Value	48	50	3	P	Enter value (right justified)
***** *****					

CARD PUNCHING & VERIFYING INSTRUCTIONS	Symbol	*Function		PROGRAM NAME RXBURN	
	D	Duplicate		PROGRAM NUMBER	DATE
	P	Punch		SOURCE DOCUMENT CARD FORM USED	
	S	Skip		PREPARED BY LARRY BRADSHAW	PAGE 1 of 1
V	Verify				
L	Left Justify				
CARD FIELD	COLUMNS FROM TO	NO. COLS.	FUNC. *	REMARKS	
***** *****					
DUFF INFORMATION PARAGRAPH ---					
This paragraph is only entered when the DUFF MOISTURE option is requested as a parameter in the PRESCRIPTION information paragraph.					
The paragraph consists of a DUFF control word card that also gives the number of layers of duff (NLAYER) and then NLAYER information cards giving the type of duff (via code) and the thickness of the layer.					
Card 1. DUFF control	1 4	4	P	Punch DUFF	
word and NLAYER	12 12	1	P	Enter number of layers (11)	
DUFF information cards (one for each layer, NLAYER)					
Duff type	1 5	5	P	Punch type code from user information sheet. Format is F5.0, decimal is punched.	
Layer Thickness	6 10	5	P	Enter thickness. Format is F5.0, decimal is punched, units are centimeters.	
***** *****					

Exhibit 18.--Card punching instructions for RXBURN Duff Information paragraph.

## Example of Input Stream for One Prescription

01

{ STATION

{ PHILIPSBURG RS 243002 5280 46 3

{ YEARS 1960 1977

{ DATES 0510 1101

{ ACTIVITY

{ DEMONSTRATION OF RXBURN OUTPUT FOR PHILIPSBURG RANGER STATION

{ IDENTIFY

{ LARRY BRADSHAW FIRE LAB MONTANA

{ PRESCRIBE 03

{ TEMPERATURE 65 75 60 80

{ RELATIVE HUMIDITY 20 30 20 55

{ WIND SPEED 4 9 0 15

RUN

@EOF

@FIN

Exhibit 19 presents user information necessary for this example. Output is shown in exhibits 20, 21, 22, and 23.

## Multiple Prescription Analysis

Program RXBURN is structured such that two or more prescription conditions may be analyzed for frequency of occurrence in one run on the same weather station.

This is accomplished by use of the SAVE and REPEAT options on the station information card in the STATION paragraph. The first directive block stores computed and observed parameter values by setting the SAVE option to TRUE. This is done with a "T" in column 48 of the station information card.

Stored computations are then used in subsequent directive blocks, which does away with the need to reread and compute all data for a station. This is accomplished by a "T" in column 46 of the second directive block. Third and subsequent directive blocks do not need the STATION paragraph entered. Remember, there is one directive block for each prescription analysis.

# RXBURN -- USER INFORMATION SHEET

Total Number Different Stations in This Run 01

User's Name BRADSHAW, Subunit FIRE LAB, Unit INT EXP STN

Project 1/ Demonstration of RXBURN output for Philipsburg Ranger Station

Fire Weather Station Information: Station name Philipsburg RS, No. 243002  
 Elevation 5280 ft., Latitude 46, Climate class 2/ 3, Slope class 3/  
 Fuel model 4/, Last frost 5/, Grass type 5/: annual         , perennial           
 Year begin 1960, Year end 1977, Date begin 0501, Date end 1101

Site Adjustment Factors (if any):

Aspect          ( 1=north, 2=east, 3=south, 4=west ), Site elevation          ft.  
 Canopy cover          ( 1=open, 2=closed )

Duff/Soil Horizon Information (if Duff Moisture selected. See User's Guide, Appendix D):

Layer	Duff/Soil Type	Thickness	
1	<u>        </u>	<u>        </u> cm	***** * 1/ Use up to 80 characters * * 2/ See User's Guide, appendix C * * 3/ See User's Guide, appendix B * * 4/ For NFDRS indices only. See User's Guide, * appendix A * 5/ For NFDRS indices only *****
2	<u>        </u>	<u>        </u> cm	
3	<u>        </u>	<u>        </u> cm	
4	<u>        </u>	<u>        </u> cm	
5	<u>        </u>	<u>        </u> cm	

Prescription Factor Selections (Check and set limits for up to 15 factors.):

Factor	Preferable Rx		Acceptable Rx	
	Minimum	Maximum	Minimum	Maximum
State of the weather.....				
<u>x</u> Temperature (deg. F).....	65	75	60	80
<u>x</u> Relative humidity (%).....	20	30	20	55
Wind direction (8 point).....				
<u>x</u> Wind speed (mi/h).....	4	9	0	15
Max temperature (24 h, deg. F).....				
Min temperature (24 h, deg. F).....				
Max relative humidity (24 h, %).....				
Min relative humidity (24 h, %).....				
Days since last precipitation.....				
Precip amount (24 h, 0.01 in).....				
1 hour fuel moisture (%).....				
10 hour fuel moisture (%).....				
NFDRS ERC.....				
NFDRS BI.....				
Duff moisture (24 h average, %).....				

Exhibit 19.--User information sheet for one prescription example.

DEMONSTRATION OF RXBURN OUTPUT FOR PHILLIPSBURG RANGER STATION

AFFIRM5 STATION NAME: PHILLIPSBURG RS  
STATION NUMBER: 243002  
ELEVATION FT MSL: 5280

NATIONAL FOREST: MONTANA  
DISTRICT: FIRELAB  
USER: BRADSHAW

YEARS OF WEATHER DATA REQUESTED: 1960 TO 1977 (18 YEARS)  
SEASONAL DATES OF ANALYSIS : MAY 1 TO NOV 1  
TOTAL DAYS AVAILABLE : 2215 DAYS OVER 16 YEARS

### PRESCRIPTION FACTOR SUMMARY

PRESCRIPTION FACTORS	PREFERABLE CONDITIONS		ACCEPTABLE CONDITIONS	
	MINIMUM	MAXIMUM	MINIMUM	MAXIMUM
1. TEMPERATURE (DEG F)	65	75	60	80
2. RELATIVE HUMIDITY (%)	20	30	20	55
3. WIND SPEED (MPH)	4	9	0	15

### **PRESCRIPTION OCCURRENCE SUMMARY**

	PREFERABLE	ACCEPTABLE	UNACCEPTABLE
DAYS PER SEASON WITHIN PRESCRIPTION (PERCENT)	8 5%	51 37%	60 58%
MONTH OF HIGHEST PRESCRIPTION FREQUENCY (PERCENT PROBABILITY)	SEP 9%	JUL 45%	OCT 71%
10 DAY PERIOD OF HIGHEST RX FREQUENCY BEGINS (PERCENT PROBABILITY)	JUN 1 OCT 1 10%	JUL 1 57%	MAY 1 78%

Exhibit 20.--Program RXBURN prescription factor and occurrence summary output for one prescription example.

## PRESCRIPTION OCCURRENCE BY 10 DAY PERIOD AND MONTH

```

*****
*
*      PERIOD      ** PREFERABLE DAYS ** ACCEPTABLE DAYS ** UNACCEPTABLE DAYS *
* MONTH  BEGINS  NO. DAYS  MEAN NUMBER PERCENT  MEAN NUMBER PERCENT  MEAN NUMBER PERCENT *
* -----
* MAY      1      104      0      5      5%      1      18      17%      5      81      78% *
* MAY     11      109      0      5      5%      2      33      30%      4      71      65% *
* MAY     21      118      1      8      7%      3      40      34%      4      70      59% *
* MAY    TOTAL    331      1     18      5%      6     91      27%     14    222      67% *
*
*****
*
* JUN      1      110      1     11     10%      3     50      45%      3     49      45% *
* JUN     11      109      0      4      4%      2     39      35%      4     66      61% *
* JUN     21      104      0      6      6%      3     45      42%      3     55      52% *
* JUN    TOTAL    325      1     21      6%      8    134      41%     11    170      52% *
*
*****
*
* JUL      1      138      0      3      2%      5     78      57%      4     57      41% *
* JUL     11      150      1      8      5%      4     62      41%      5     80      53% *
* JUL     21      165      0      5      3%      4     63      38%      6     97      59% *
* JUL    TOTAL    453      1     16      4%     13    203      45%     15    234      52% *
*
*****
*
* AUG      1      159      0      7      4%      4     66      42%      5     86      54% *
* AUG     11      146      0      3      2%      4     56      38%      5     87      60% *
* AUG     21      160      1     10      6%      4     67      42%      5     83      52% *
* AUG    TOTAL    465      1     20      4%     12    189      41%     16    256      55% *
*
*****
*
* SEP      1      137      1     12      9%      3     55      40%      4     70      51% *
* SEP     11      129      1     11      9%      3     45      35%      5     73      57% *
* SEP     21      117      1     11      9%      2     39      33%      4     67      57% *
* SEP    TOTAL    383      2     34      9%      9    139      36%     13    210      55% *
*
*****
*
* OCT      1      90      1      9     10%      1     20      22%      4     61      68% *
* OCT     11      90      0      3      3%      1     21      23%      4     66      73% *
* OCT     21      78      0      0      0%      1     22      28%      4     56      72% *
* OCT    TOTAL    258      1     12      5%      4     63      24%     11    183      71% *
*
*****
*
* NOV    TOTAL      0      0      0      0%      0      0      0%      0      0      0% *
*
*****
*
* TOTAL    TOTAL    2215      8    121      5%      51    819      37%     80    1275      58% *
*
*****

```

Exhibit 21.--Program RXBURN prescription run length summary output for one prescription example.



### PRESCRIPTION RUN LENGTH SUMMARY

[illegible]

Exhibit 22.--Program RXBURN prescription occurrence by 10-day period and month output for one prescription example.

## PROBABILITY OF MEETING PRESCRIPTION 1, 2, AND 3 DAYS IN THE FUTURE

```

*****
*
*                               MONTH: MAY
*
* TODAYS   *** TOMORROW ***   **** 2 DAYS ****   **** 3 DAYS ****   N DAYS
* COND     PREF  ACCP  UNAC   PREF  ACCP  UNAC   PREF  ACCP  UNAC
*
* PREF      17%   50%   33%    9%   38%   53%    7%   32%   61%   PREF   18
*
* ACCP      12%   47%   41%    8%   35%   55%    7%   31%   62%   ACCP   95
*
* JNAC       2%   18%   80%    4%   24%   72%    5%   25%   68%   UNAC  216
*
*****

```

```

*****
*
*                               MONTH: JUN
*
* TODAYS   *** TOMORROW ***   **** 2 DAYS ****   **** 3 DAYS ****   N DAYS
* COND     PREF  ACCP  UNAC   PREF  ACCP  UNAC   PREF  ACCP  UNAC
*
* PREF      20%   60%   20%   10%   51%   39%    8%   45%   47%   PREF   20
*
* ACCP       9%   56%   35%    8%   47%   45%    7%   43%   49%   ACCP  132
*
* JNAC       3%   28%   69%    5%   37%   58%    6%   40%   54%   UNAC  173
*
*****

```

```

*****
*
*                               MONTH: JUL
*
* TODAYS   *** TOMORROW ***   **** 2 DAYS ****   **** 3 DAYS ****   N DAYS
* COND     PREF  ACCP  UNAC   PREF  ACCP  UNAC   PREF  ACCP  UNAC
*
* PREF       0%   75%   25%    4%   48%   48%    4%   45%   51%   PREF   16
*
* ACCP       4%   52%   44%    4%   46%   51%    4%   45%   52%   ACCP  206
*
* JNAC       3%   36%   61%    3%   43%   54%    4%   44%   52%   UNAC  227
*
*****

```

Exhibit 23.--Program RXBURN probability of meeting prescription in the future output for one prescription example.



01

second { STATION

          SAME STATION 123456 2345 45 H 3 P 3 0615 T T 2 4500. 1

directive { YEARS 1900 1978

          DATES 0101 1215

block { PRESCRIBE 01

          NFDRS ERC 4 8 4 15

          RUN

---

01

third { PRESCRIBE 01

directive { WIND SPEED 13 18 10 20

block { RUN

---

01

fourth { PRESCRIBE 03

directive { WIND DIRECTION D W S NW

          WIND SPEED 4 8 2 12

block { MAX TEMPERATURE 65 72 60 78

          RUN

@EOF

@FIN

## Error Messages

1. No recognizable input cards - Incorrect input stream - Program Aborted.  
Cause: Misspelled control word on a control card, or control card word not beginning in column 1.
2. At least one option is incorrect or was started in the wrong column - Program Aborted.  
Cause: Misspelled option after the PRESCRIBE control card, or option card did not begin in column 6.
3. Difference between site and AFFIRMS station greater than 2000 feet, no adjustments made.  
Cause: Self-explanatory.

## Output Quantities

For each station and/or prescription analysis in a single RXBURN run, approximately five pages of output are produced, with a maximum of nine for a full 12-month analysis.

## Cost Estimates

For a typical RXBURN run (one station, 5- to 6-month analysis, three to four prescription parameters) a user can expect costs and resource use as outlined below.

<u>Run priority</u>	<u>Cost</u>	<u>CAU (sec)</u>	<u>Resource time</u>
DEMAND	\$4.00 to \$5.00	8 to 9	10 to 11
L	\$2.00 to \$2.50	8 to 9	10 to 11
N	\$1.00 to \$1.50	8 to 9	10 to 11
P	\$0.75 to \$1.00	8 to 9	10 to 11

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1981. A computer system for scheduling fire use. Part II: computer terminal operator's manual. USDA For. Serv. Gen. Tech. Rep. GTR-100, 34 p. Intermt. For. and Range Exp. Stn., Ogden, Utah 84401.

Provides program writeups, including input requirements, keypunch instructions, job control language, example of output, error messages, and cost estimates for two computer programs: RXWTHP and RXBURN. These programs comprise a system designed to aid in predicting the probable occurrence of desired prescribed fire weather conditions.

KEYWORDS: prescribed fire, fire use plans, climatology, computer programs.

Bradshaw, Larry S., and William C. Fischer.

1981. A computer system for scheduling fire use. Part II: computer terminal operator's manual. USDA For. Serv. Gen. Tech. Rep. GTR-100, 34 p. Intermt. For. and Range Exp. Stn., Ogden, Utah 84401.

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